

REMARKS

Claims 46 and 73 are canceled without prejudice, and therefore claims 42 to 45 and 47 to 71 are being considered. Claims 31 to 41 were previously withdrawn in response to a restriction requirement.

Applicants respectfully request reconsideration of the present application in view of this response.

With respect to page three (3) of the Office Action, claims 42 to 45, 47 to 53, 61 to 71 and 73 were rejected under 35 U.S.C. § 103(a) as obvious over Kadomura, U.S. Patent No. 5,662,819 in view of Collins et al., U.S. Patent No. 6,217,785 and Wilbur, U.S. Patent No. 6,020,794.

As regards the obviousness rejections, to reject a claim as obvious under 35 U.S.C. § 103, the prior art must disclose or suggest each claim feature and it must also provide a motivation or suggestion for combining the features in the manner contemplated by the claim. (See Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 934 (Fed. Cir. 1990), cert. denied, 111 S. Ct. 296 (1990); In re Bond, 910 F.2d 831, 834 (Fed. Cir. 1990)). Thus, the “problem confronted by the inventor must be considered in determining whether it would have been obvious to combine the references in order to solve the problem”, Diversitech Corp. v. Century Steps, Inc., 850 F.2d 675, 679 (Fed. Cir. 1998). It is respectfully submitted that the prior art simply does not address the problems met by the subject matter of any of the rejected claims, as referred to in the present application.

Accordingly, while the rejections may not be agreed with, to facilitate matters, claim 42 as presented is to a method for etching a silicon body substrate using a device having an ICP source for generating a radio-frequency electromagnetic alternating field, and includes the features in which *the pulsing of the injected, pulsed radio-frequency power is accompanied by a change of a frequency of the injected, pulsed radio-frequency power, the change in the frequency being controlled so that the plasma power injected into the inductively coupled plasma during the pulsing is maximized*, and in which the ICP coil generator causes a variation of the frequency of the radio-frequency electromagnetic alternating field so that the impedance is matched as a function of the pulsed plasma power to be injected, *so as to provide rapid switching between the pulses of the pulsed plasma power and interpulse periods*.

As regards the Kadomura reference and the secondary Collins reference, any review of these references makes plain that they do not disclose these features in the context of claim 42 as presented.

In the method referred to in the “Wilbur” reference, a sensor 16 and a “digital signal processor (DSP) 20” having memory locations 21, 22 and an evaluation algorithm 24 (column 3, line 66 through column 4, line 25, and figure 1) are provided for adjusting the frequency of the RF generator to the plasma impedance. To this end, sensor 16 measures the values “reflected power” and “forward power” and transmits them to the DSP, where they are evaluated according to stored algorithm 24 and compared to previous values. Depending on the result of the comparison, a signal is emitted for an increase or a decrease of the frequency, and these steps are repeated until an optimal value is set. With this method, a sensor and a digital signal processor (DSP) are used to vary a frequency.

In contrast, with claim 42 as presented, *the generator itself brings about (the “generator causes”) a variation of the frequency for adjustment to the impedance*, so that a sensor and an evaluation processor are not provided and are not needed. As regards the exemplary embodiment of the present application, a frequency-selective part 1 (see Figure 2 and related text) is used to vary the frequency. This adjustment of the impedance through frequency variation occurs automatically and very rapidly within a few periods of oscillation of the high-frequency a.c. voltage generated by the ICP coil generator (which is in the microsecond range of the exemplary embodiment, for example). This provides or at least better ensures a sufficiently rapid switching as provided for in claim 42 as presented (“provide rapid switching between the pulses of the pulsed plasma power and interpulse periods.”).

Accordingly, claim 42 as presented is allowable, as are claims 43 to 45, 47 to 53 and 61 to 71 which depend from claim 42 as presented. As to claim 73, it has been canceled without prejudice in view of the amendments to claim 42. It is therefore respectfully requested that the rejections be withdrawn.

At page five (5), claim 46 was rejected under 35 U.S.C. § 103(a) as obvious over Kadomura in view of Collins and Wilbur as applied to claims 42 to 45, 47 to 53, 61 to 71 and 73 and further in view of Koshimizu ‘687, U.S. Patent No. 5,997,687.

While the rejection is not agreed with, claim 46 has been canceled without prejudice

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in view of the amendments to claim 42, as explained above. Applicants therefore respectfully request withdrawal of the rejection of claim 46 as moot.

At page six (6), claim 60 was rejected as unpatentable over Kadomura in view of Collins and Wilbur and further in view of Laermer et al., U.S. Patent No. 5,501,893.

Claim 60 depends from claim 42 as presented and is therefore allowable for the same reasons as claim 42 as presented, since the Laermer reference does not cure the critical defects of the Kadomura, Collins and Wilbur references. Applicants therefore respectfully request withdrawal of the rejection of claim 60.

At page six (6), claims 42 to 45, 50 to 54, 56 to 59, 61, 63 to 71 and 73 were rejected as unpatentable under 35 U.S.C. § 103(a) over Savas, WO 97/14177 in view of the Collins and the Wilbur reference.

As explained above, claim 73 has been canceled without prejudice in view of the amendments to claim 42.

Also, while the rejections may not be agreed with, to facilitate matters, claim 42 as presented is to a method for etching a silicon body substrate using a device having an ICP source for generating a radio-frequency electromagnetic alternating field, and includes the features in which *the pulsing of the injected, pulsed radio-frequency power is accompanied by a change of a frequency of the injected, pulsed radio-frequency power, the change in the frequency being controlled so that the plasma power injected into the inductively coupled plasma during the pulsing is maximized*, and in which the ICP coil generator causes a variation of the frequency of the radio-frequency electromagnetic alternating field so that the impedance is matched as a function of the pulsed plasma power to be injected, *so as to provide rapid switching between the pulses of the pulsed plasma power and interpulse periods*.

As regards the Savas reference and the secondary Collins reference, any review of these references makes plain that they do not disclose these features in the context of claim 42 as presented. Also, as explained above, the Wilbur reference does not cure these deficiencies. Accordingly, it is respectfully submitted that claim 42 as presented is allowable because it includes these further features which are not disclosed by these reference for essentially the reasons discussed above.

Claims 43 to 45, 50 to 54, 56 to 59, 61, and 63 to 71 depend from claim 42 as

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presented, and are therefore allowable for the same reasons as claim 42 as presented, since the Savas reference does not cure the critical deficiencies of the Collins and Wilbur references. Claim 73 has been canceled without prejudice in view of the amendments to claim 42, as explained above.

Applicants therefore respectfully request withdrawal of the rejection of claim 42, as well as dependent claims 43 to 45, 50 to 54, 56 to 59, 61 and 63 to 71 and 73.

At page nine (9), claim 46 was rejected as unpatentable under 35 U.S.C. § 103(a) as unpatentable over Savas in view of Collins and Wilbur as applied to the claims 42 to 45, 50 to 54, 56 to 59, 61, 63 to 71 and 73 and further in view of Koshimizu '687.

While the rejection may not be agreed with and as explained above, claim 46 has been canceled without prejudice in view of the amendments to claim 42. Applicants therefore respectfully request withdrawal of the rejection of claim 46 as moot.

At page ten (10), claims 47 to 49, 55 and 62 were rejected as unpatentable over Savas in view of Collins and Wilbur as applied to claims 42 to 45, 50 to 54, 56 to 59, 61, 63 to 71 and 73, and further in view of Lymberopoulos et. al., U.S. Patent 6,085,688.

Claims 47 to 49, 55 and 62 depend from claim 42 as presented, and are therefore allowable for the same reasons as claim 42 as presented, since the Lymberopoulos reference does not cure the critical defects of the Savas, Collins and Wilbur references, as explained above. Applicants therefore respectfully request withdrawal of the rejections of claim 47 to 49, 55 and 62.

At page eleven (11), claim 60 was rejected as unpatentable over Savas in view of Collins and Wilbur as applied to claims 42 to 45, 50 to 54, 56 to 59, 61, 63 to 71, and 73, and further in view of the Laermer reference.

Claim 60 depends from claim 42 as presented and is therefore allowable for the same reasons as claim 42 as presented, since the Laermer reference does not cure the critical defects of the Savas, Collins and Wilbur references. Applicants therefore respectfully request withdrawal of the rejection of claim 60.

At page eleven (11), claims 42 to 45, 50 to 53, 56 to 59, 61, 63 to 71 and 73 as unpatentable over Koshimizu '373, U.S. Patent No. 5,935,373, in view of the Collins and Wilbur references.

The Office Action admits that Koshimizu '373 does not disclose the feature of

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matching an impedance of one of an inductive coupled plasma and the ICP source to an ICP coil generator.

Still further, and while the rejections may not be agreed with, to facilitate matters, claim 42 as presented is to a method for etching a silicon body substrate using a device having an ICP source for generating a radio-frequency electromagnetic alternating field, and includes the features in which *the pulsing of the injected, pulsed radio-frequency power is accompanied by a change of a frequency of the injected, pulsed radio-frequency power, the change in the frequency being controlled so that the plasma power injected into the inductively coupled plasma during the pulsing is maximized*, and in which the ICP coil generator causes a variation of the frequency of the radio-frequency electromagnetic alternating field so that the impedance is matched as a function of the pulsed plasma power to be injected, *so as to provide rapid switching between the pulses of the pulsed plasma power and interpulse periods*.

As regards the Koshimizu '373 reference and the secondary Collins reference, any review of these references makes plain that they do not disclose these features in the context of claim 42 as presented. Also, as explained above, the Wilbur reference does not cure these deficiencies. Accordingly, it is respectfully submitted that claim 42 as presented is allowable because it includes these further features which are not disclosed by these references for essentially the reasons discussed above.

Claims 43 to 45, 50 to 54, 56 to 59, 61, and 63 to 71 depend from claim 42 as presented, and are therefore allowable for the same reasons as claim 42 as presented, since the Koshimizu '373 reference does not cure the critical deficiencies of the Collins and Wilbur references. Claim 73 has been canceled without prejudice in view of the amendments to claim 42, as explained above.

Applicants therefore respectfully request withdrawal of the rejection of claim 42, as well as dependent claims 43 to 45, 50 to 54, 56 to 59, 61 and 63 to 71 and 73.

At page fourteen (14), claim 46 was rejected as unpatentable under 35 U.S.C. § 103(a) over Koshimizu '373 in view of Collins and Wilbur as applied to claims 42 to 45, 50 to 53, 56 to 59, 61, 63 to 71 and 73, and in further view of the Koshimizu '687 reference.

Claim 46 has been canceled without prejudice in view of the amendments to claim 42. It is therefore respectfully requested that the rejection be withdrawn as moot.

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At page fifteen (15), claims 47 to 49, 54, 55 and 62 were rejected as unpatentable under 35 U.S.C. § 103(a) over Koshimizu '373 in view of Collins and Wilbur as applied to claims 42 to 45, 50 to 53, 56 to 59, 61 and 63 to 71 and 73, and in further view of the Lymberopoulos reference.

Claims 47 to 49, 54, 55 and 62 depend from claim 42, and are therefore allowable for the same reasons as claim 42 as presented, since the fourth-level "Lymberopoulos" reference does not cure the critical deficiencies of the primary, secondary and third-level references, nor does it provide the motivation to combine the references so as to provide the claimed subject matter of claim 42 and its resulting benefits. Applicants therefore respectfully request withdrawal of the rejection of claims 47 to 49, 54, 55 and 62.

At page sixteen (16), claim 60 was rejected as unpatentable under 35 U.S.C. § 103(a) over Koshimizu '373 in view of Collins and Wilbur as applied to claims 42 to 45, 50 to 53, 56 to 59, 61, 63 to 71 and 73, and in further view of the Laermer reference.

Claim 60 depends from claim 42 as presented, and is therefore allowable for the same reasons as claim 42 as presented over the Koshimizu '373, Collins and Wilbur references, as explained above, since the fourth-level "Laermer et al." reference does not cure the critical deficiencies of the primary, secondary and third-level references.

Accordingly, claims 42 to 45 and 47 to 71 are allowable for all of the above reasons.

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CONCLUSION

In view of the foregoing, it is believed that the rejections have been obviated, and that claims 42 to 45 and 47 to 71 are allowable. It is therefore respectfully requested that the rejections be withdrawn since the rejections have been obviated, and that the present application issue as early as possible.

Respectfully submitted,
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